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Harold L. Miller, Jr. (1971–1975)

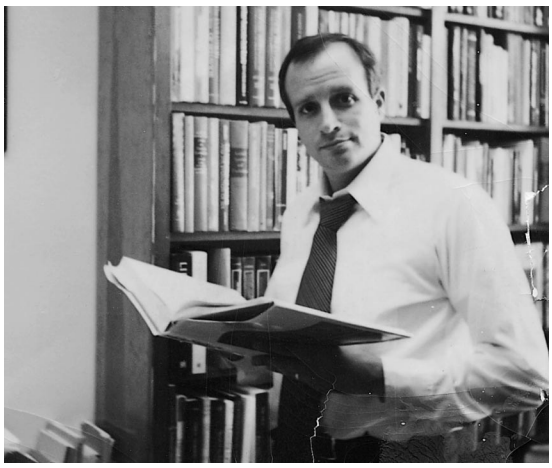
QUALITATIVELY DIFFERENT REINFORCERS IN THE HARVARD PIGEON LAB

I owe my place in the Pigeon Lab at Harvard directly to Peter Killeen and to the anonymous graders of the qualifying exams (the notorious prelims) administered at the end of my 1st year as a Harvard PhD student. To Peter because he invited me to join his newly established lab at Arizona State University when I was a junior there and allowed me to collaborate with him in research on a qualitatively different reinforcer: light. He was mentor as much as collaborator and encouraged me to put Harvard in my sights. No doubt his role in recommending me made a large difference to my admission. And to the anonymous graders because passing the exams made it possible for me to stake out a place in the lab. At the time, there was a strict policy of commencing one's research only after the exams had been taken (and passed).

My 1st year at Harvard brought me into contact with Dick Herrnstein, whose graduate seminar, Motivation and Action, was to prove pivotal to my subsequent research. My adviser in that year was Billy Baum, distinguished by lengthy beard and wall-covering poster of Maher Baba, and, like Dick, degrees only from Harvard. Although Peter had first acquainted me with the matching law, taking Dick's seminar and assisting Billy in his undergraduate learning course drove the acquaintance deeper and to the point of inspiring research projects I could call my own. I recall Dick mentioning all sorts of ways in which the matching law could be extended (on both sides of the equation) and practically begging that matching be studied in an experimental arrangement involving choice between different kinds (qualities) of reinforcers.

The seventh-floor (William James Hall) lab that I entered in my 2nd year was storied, not least because of the list of those who had completed dissertations there (and in the precursor labs elsewhere on campus) while using virtually the same equipment that was still in place, and the fact that Fred Skinner's office was adjacent. He had retired before I arrived but was still a frequent presence (in his office but never in the lab) and, as the object of visits from notable guests and media from around the world, very much a celebrity. The lab proper occupied as many as 10 rooms of various size, including colony rooms for individually housed pigeons and rats (and one presiding crow), rooms containing experimental chambers, and rooms housing the apparatus for experimental control—rows of relay racks that reached floor to ceiling. Later a new gadget—a PDP-8® minicomputer—made its appearance in the lab and, in tandem with the programming language known as SKED®, revolutionized the way we conducted research. The rooms containing chambers were linked to those containing the control equipment by bundles of cables that wound their way through walls, above the ceiling, and along the floor. The whole scene gave the distinct impression of wire world gone amok. When animals were active in all the chambers, there was an attendant cacophony of click-clacking, whirring, buzzing, and so forth that added to the head-spinning sense of order on the verge of welter.

My first task was to self-learn the relay circuitry (Peter's lab had been Digibit based); a rite of passage, it seemed. Electrical shorts and more than a few shocks were part of the



Harold L. Miller, Jr. (circa 1972).

experience in an environment that mixed AC and DC circuits. I recall the elation that came with finally programming a VI schedule, which proved a secondary feat compared to the nightmare that was a concurrent VI VI schedule with a changeover delay. There were endless simulations of the procedure at the relay rack, followed by shuttling back and forth from rack to chamber in an effort to ascertain that everything was happening just as it should before bird (or rodent) was ever drafted for service. Even then, I was no stranger to the sinking feelings that came with subsequent discovery of oversights in the programming or unnoticed failures of the equipment.

My primary associate through the thick and thin of 4 years' research was Will Vaughan. We shared an office, and conversations there formed the primary substance of my graduate education. With Will's help I designed experiments, wired them, ran them, and made sense of the results. We traded off running each other's subjects: I in the early morning and on Saturdays, he in the evenings and on Sundays. In between they were run by two pillars of the lab: Kitty Papp and Ginny Upham.

My research required the modification of pigeon and rat chambers to include a pair of grain hoppers or liquid dispensers instead of the one that was standard equipment. I arranged the purchase of several types of grain for use with pigeons and produced several concentrations of sugar water and sweetened condensed milk solutions for use with rats. These became the qualitatively and quantitatively different reinforcers in a variety of concurrent VI VI arrangements, probably more than 20 separate experiments by the time my graduate career concluded. Two of them figured in my dissertation (which Dick advised); one of them was subsequently published (Miller, 1976). The upshot of these variations on a theme was a method for the measurement of reinforcer value—hedonic scaling—premised on deviations from matching to reinforcement rate alone.

I typed my dissertation using a nonelectric Smith-Corona portable; all the figures were hand drawn. After the dissertation defense in June 1975, my family and I moved to Utah. On the day before we left, I dropped by Dick's office for a final chat. He complimented the dissertation and wished me well. I asked him an odd question: Did he have any recollection of why I had ever been admitted to the program? He mentioned Peter's endorsement, then added that an item in my record—namely, attending a junior college in Florida—had reminded him of summers he had spent in military consulting at an Air Force base near the college. He figured it as a good sign. From such subtleties of contingency are graduate careers made.

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